

1      CLAIMS

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3      1. A wrench having a head portion (10,110) adapted to  
4      engage and apply torque to a workpiece (42), said head  
5      portion (10,110) including a flexible ring portion  
6      (14,114) having an inner working surface for engaging  
7      the workpiece (42), such that, when a torque is applied  
8      to said head (10,110) in a predetermined direction  
9      (48,148), said ring portion closes around said  
10     workpiece (42).

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12     2. A wrench as claimed in Claim 1 having a head  
13     portion (10) adapted to engage and apply torque to a  
14     workpiece (42), said head portion (10) including a ring  
15     member (14) adapted to substantially surround a  
16     peripheral surface of a workpiece (42) and having a  
17     first, fixed end (16) and a second, free end (18) such  
18     that, when an inner surface of said ring member (14)  
19     engages a workpiece (42) and a torque is applied to  
20     said head portion (10) in a predetermined direction  
21     (48), said ring member (14) closes around said  
22     workpiece (42).

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24     3. A wrench as claimed in Claim 2, wherein said  
25     wrench further includes a first cam surface (28)  
26     disposed adjacent an outer surface (30) of a free end  
27     portion of said ring (14) such that, when said inner  
28     surface of said ring member (14) engages said workpiece  
29     (42) and said torque is applied to said head portion  
30     (10) in said predetermined direction (48), said first  
31     cam surface presses against said outer surface (30) of  
32     said free end portion of said ring (14).

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2 4. A wrench as claimed in Claim 3, wherein said first  
3 cam surface (28) is generally convex.

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5 5. A wrench as claimed in Claim 3 or Claim 4, wherein  
6 said outer surface (30) of said free end portion is  
7 generally concave.

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9 6. A wrench as claimed in any one of Claims 3 to 5,  
10 wherein said first cam surface (28) is formed  
11 integrally with said wrench.

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13 7. A wrench as claimed in any one of Claims 3 to 5,  
14 wherein said first cam surface (28) is provided by an  
15 insert (32).

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17 8. A wrench as claimed in any any one of Claims 2 to  
18 7, wherein said ring member (14) comprises a plurality  
19 of segments (20a-f).

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21 9. A wrench as claimed in Claim 8, wherein said  
22 segments (20a-f) define a generally polygonal inner  
23 surface of said ring member (14).

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25 10. A wrench as claimed in Claim 8 or Claim 9, wherein  
26 each of said segments (20a-f) has an inner surface  
27 which is generally convex in the circumferential  
28 direction of said ring member (14).

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30 11. A wrench as claimed in any one of Claims 8 to 10,  
31 wherein at least some of said segments (20a-f) are  
32 formed integrally with one another and said ring member

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1 (14) is adapted to deform resiliently at junctions  
2 (24a-e) between adjacent, integrally formed segments.

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4 12. A wrench as claimed in Claim 11, wherein said  
5 junctions (24a-e) between adjacent, integrally formed  
6 rings have a reduced thickness in the radial direction  
7 as compared with the remainder of said segments (20a-  
8 f).

9  
10 13. A wrench as claimed in Claim 12, wherein said  
11 junctions (24a-e) comprise portions of the inner  
12 surface of said ring member which are generally concave  
13 in the circumferential direction of said ring member  
14 (14).

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16 14. A wrench as claimed in any one of Claims 2 to 13,  
17 wherein the inner surface of said ring member is  
18 corrugated.

19  
20 15. A wrench as claimed in any one of Claims 2 to 14,  
21 wherein said head portion (10) includes means for  
22 limiting movement of said free end (18) of said ring  
23 member (14) relative to said fixed end (16) thereof in  
24 said predetermined direction (48).

25  
26 16. A wrench as claimed in any one of Claims 2 to 15,  
27 wherein said head portion (10) includes means for  
28 limiting movement of said free end (18) of said ring  
29 member (14) relative to said fixed end (16) thereof in  
30 a direction (50) opposite to said predetermined  
31 direction (48).

1 17. A wrench as claimed in any one of Claims 2 to 16,  
2 wherein said head portion (10) includes hinge means  
3 (60, 62, 64, 68, 72, 74) whereby at least a portion of  
4 said ring member (14) may be pivoted in the plane of  
5 said ring member (14) relative to the remainder of said  
6 head portion (10).

8 18. A wrench as claimed in Claim 17, wherein said ring  
9 member comprises a plurality of segments (20a-f) and  
10 wherein said hinge means (60, 62, 64, 68, 72, 74) is  
11 located between at least one pair of adjacent segments  
12 (20a-f).

13  
14 19. A wrench as claimed in Claim 16 or Claim 17,  
15 including resilient bias means (80) associated with  
16 said hinge means (60, 62, 64, 68, 72, 74) and adapted  
17 to bias said ring member towards a closed position.

19 20. A wrench as claimed in Claim 1, wherein said ring  
20 portion (114) is pivotably connected to a yoke portion  
21 (204) of said head (110) and comprises a plurality of  
22 segments (120a-f) interconnected by an elongate  
23 flexible member (202) having first and second free ends  
24 (202a,b) secured to said yoke portion (204) such that  
25 pivoting movement of said ring (114) relative to said  
26 yoke (204) in a predetermined direction (148) causes a  
27 length of said elongate flexible member (202) passing  
28 around said ring (114) to be shortened and the ring  
29 (114) to close.

31 21. A wrench as claimed in claim 20, wherein first and  
32 second segments (120a,b) of said ring (114) are formed

1 integrally with one another as part of a pivot member  
2 (200) pivotably mounted in said yoke (204) by means of  
3 a pivot pin (206) and the remainder of said segments  
4 (120c-f) are formed as discrete members, said flexible  
5 elongate member being threaded through said remainder  
6 of said segments (120c-f) and the free ends (202a,b)  
7 thereof passing around an outer surface (214) of said  
8 pivot member and around said pivot pin (206).

9

10 22. A wrench as claimed in Claim 21, wherein the first  
11 free end (202a) of the flexible elongate member (202)  
12 extends from one of said discrete segments (120f),  
13 passes around one part of said outer surface (214) of  
14 said pivot member (200) opposite an inner surface  
15 thereof defining a first segment (120a), over the top  
16 of, around and under the pivot pin (206), and out of  
17 the front of the yoke portion (204), and wherein the  
18 second free end (202b) of the elongate flexible  
19 member (202) extends from another of said discrete  
20 segments (120c), passes around a second part of said  
21 outer surface (214) of the pivot member (200) opposite  
22 an inner surface thereof defining a second segment  
23 (120b), under the first free end (202a) and the pivot  
24 pin (206), and out of the front of the yoke portion  
25 (204).

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